

Screenplay for NFB ACI-West
"Time-Lapse Canada" Series

Earth Moves

(The Accelerated Earth)

5 films, 3 minutes each

Second Draft: February 2001

(First Draft: July 1999)

Writer/director: Stephen Arthur

Producer: George Johnson

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Notes:

NO TIME PERIODS ARE OMITTED: each film can be thought of as a single, continuous, "cinema-verite" scene. The rate of time lapse changes to see things we would otherwise miss. The exact speed of time-lapse at any point is given in the accompanying *storyboards*.

TIME COUNTER: Throughout all films there is a time counter displayed on screen, always in the same position, looking and working just like a car mileage counter. From this, the current time and the current speed of time-lapse is obvious. Because of the purely sensory time indications of the soundtrack, many viewers will enjoy and understand the animation just fine without even having to look at the numbers. Other viewers will find the actual numbers will increase the value of the films tremendously. Numbers in the *screenplays* give the time in "millions of years ago" (mya).

RECOGNIZING TIME-LAPSE SPEED AND TIME DIRECTION FROM THE SOUNDTRACK: The speed of ambient sound literally changes in direct proportion to time-lapse speed, easily recognized as backward or forward sound, and fast, slow, accelerating or decelerating, by shifts in frequency and speed. Familiar sounds like automobile brakes may indicate deceleration and stopping of the time-lapse rate of our "time machine". Sound of shifting gears indicates reversal of time direction. Ambient sound for speed recognition may include wind, earthy rumbling (very easy to recognize speed differences), familiar fast-forward tape or CD sound, as well as wildlife ambience indicating various time periods of evolution.

METEOR IMPACTS: The full range of bombardment is only depicted in the storyboard for Film Five. It is quite spectacular, and continuous. The storyboards and screenplays for the other four films depict only the most major mass extinction events, or meteor impacts that are part of the narrative development (i.e., camera motivation); the ongoing impacts are not mentioned. Note that the frequency of impacts gives *visual* indication of changes in time-lapse rate.

VOLCANO FIREWORKS: Chains of volcanoes will look like bursts of fireworks. The life of one volcano is a single burst.

SUBMERGED CONTINENT: Continental margins submerged under high sea levels or inland seas will be rendered slightly paler blue than the deep ocean, to aid recognition.

CHARACTER SCENES are *live action*; all the rest is digital photorealistic 3D computer-generated imagery.

FILM 1: BREAKUP OF PANGEA (QUEBEC/ATLANTIC)

FADE IN:

EXT. CAPE BRETON ISLAND - OFF SHORE - ROWBOAT

BOY is trapping lobsters from the rowboat.

CLOSER as he poises with the trap, gazing out to sea for a moment, then he hurls the lobster trap out into the deep --

BOY'S POV

as the lobster trap descending slowly into the mysterious depths. The CAMERA begins to PULL BACK...

REVEALING the whole bay, straight up in a SLOWLY RISING AERIAL SHOT of the Cape Breton coastline, increasing speed as all of the Gulf of St Laurence is revealed, continuing faster and faster until we're above the atmosphere and still going, revealing the entire width of North America now, but not stopping, arriving to SLOW TO A STOP with a view of the whole globe, in orbit above North America, the edges of the globe curving away from us on all sides.

Full Earth (RE-USED)

A pause. SOUND of SHIFTING GEARS.

'FAST REWIND' SOUNDTRACK BEGINS as a pulse of white ice eclipses Canada for a moment. The entire continent is changing shape in TIME-LAPSE -- writhing BACKWARDS IN TIME, as the spinning numbers on the counter show us --

Fireworks of volcanoes in the West. Chunks of Western land break off and drift away. Seas restlessly probe across the land, coastlines fluttering.

A large continent collides with North America, raising massive central mountains. Then the continents separate again.

The other continents drift out of view. North America is half submerged and turns brown and barren... SOUND of 'BRAKING' as the 'FAST REWIND' SOUND STOPS -- the TIME LAPSE grinds to a HALT at 500 million years ago.

SOUND OF GEARS SHIFTING again. FAST FORWARD SOUND EFFECTS start, but now MUCH SLOWER than the rewind we just saw -- the TIME LAPSE is now moving FORWARD at a rate we can easily follow. Proto-North America is submerged except for northern Ontario across to Greenland, which is fused to it. Events are developing toward the present as the time counts down.

Island arcs collide on the Eastern side, raising mountains,

followed by a piece of continent in the North (Scandinavia and part of Russia), and then comes another string of volcanic islands south of that, raising more mountains.

The land turns green (the first forests, at 390 mya). More eastern mountains are pushed up by another incoming submerged mass (Spain). And in the submerged West a string of volcanic islands emerge running North-South.

Enter a whopping big continent from the southeast (Africa joined to South America), looming in from near the South Pole, covered with ice at first.

The northern part collides, starting to raise Himalayan-size mountains, while at the same time (at 360) the western island string suddenly drifts away, out of view, as a huge white ice sheet invades the southern part of this coming-together supercontinent. More of the land is exposed.

The southern part collides at 300, forcing up more of the huge central mountain range of this new giant continent (Pangea). The southern ice sheet retreats.

EXPLOSION up north on the round horizon -- there's a brief DARK PULSE, and we notice all the colors have shifted (biggest mass extinction, at 255).

Central Action

CAMERA begins to TRUCK IN, towards this startling event. We drift in for a CLOSER view, at a SHALLOWER angle, of the central Pangean mountains as they continue to melt to half their size (220).

Overhead a blazing meteor streaks toward us -- BANG! A gigantic asteroid impact in Quebec --

INSERT CLOSEUP - CRATER

The impact DRAWS THE CAMERA IN MUCH CLOSER, to see the crater on the other side of the melting mountains, and another shift in coloring of the land -- SOUND OF BRAKING, SOUNDTRACK DECELERATES to slower, lower sound, as TIME-LAPSE SLOWS DOWN to see if we can catch more detail--

-- and right away something else catches our eye below us, in the mountains. Lots of volcanoes are suddenly popping and pressure is bulging and cracking all around, cracks joining up, as we TILT DOWN and TRACK IN CLOSER STILL --

--A gigantic, bulging crack is splitting open right below us. SNAP! A sudden release of tension and the middle of the crack drops down --

CLOSEUP - RIGHT INSIDE THE RIFT

Sharp faulted rock juts up on either side as more fragments drop and the crack widens, filling with jiggling black lava fields and ephemeral lakes and rivers --

BACK TO VIEW ABOVE THE CRACK

Suddenly the ocean fills the rift -- the Atlantic ocean is born, steadily opening.

PULL BACK a little for a wider view as the unfamiliar-looking Canadian east coast recedes (Canada still attached to Scandinavia at Greenland), watching from the African side as the Atlantic widens and Canada recedes from us. Coastlines everywhere subside and the old mountains and new palisades are all melting down from erosion as the sea level flutters and undulates around the edges (150).

Final Formation

SPEED THE TIME-LAPSE BACK UP AGAIN and PULL BACK FURTHER above the Earth to see more. A new inland sea probes and spreads out across North America, separating it completely down the middle. Scandinavia drifts away from Greenland. Mountains in Greenland subside as a new rift crack develops between it and Canada.

The inland sea undulates around as Greenland finally breaks away from Arctic Canada. The Atlantic coast is still partly submerged, not familiar looking yet.

FLASH! -two asteroid impacts to our lower left (Midwest USA and Mexico) - a DARK PULSE and its COLOR-SHIFT aftermath (dinosaur extinction at 65) --

This DRAWS THE CAMERA IN, toward the impact area, but as we truck in over the forming Maritimes coast -- POW! A smaller meteor strike right in front of us, just off shore (50) --

CAMERA now turns downward a little to head on down to the coast, close enough now to see the emerging new forms of Nova Scotia and Newfoundland (14).

ZAP! -- FAST PULSE OF ICE spreads across the land, then gone -- TIME LAPSE SLOWS WAY DOWN NOW, SCREECHING TO A HALT, but the CAMERA KEEPS TRUCKING IN, VERY CLOSE, until we've slowed to REAL TIME, drifting in to the familiar outline of Nova Scotia, the present day, to Cape Breton, until we stop, close enough to see the tiny, distant figure of the Boy throw his lobster trap into the water...

FADE OUT.

FILM 2: BIRTH OF THE WEST (BC/YUKON)

FADE IN:

EXT. BRITISH COLUMBIA - FRASER VALLEY - GIRL

GIRL sits under a spreading apple tree having a tranquil picnic, admiring the range of mountain peaks across the way. We see the apples above her. Wind picks up. Girl take out a book to read, a Bible. After a thoughtful look at the mountains, she opens the Bible to the first page. We can see the title in big letters: "GENESIS".

INSERT - APPLE DROPPING

BONK! The apple hits her on the head, hard. Surprised, dizzy, but with an intrigued expression, she looks skyward as everything starts to SPIN --

The CAMERA PULLS BACK, SPIRALING UPWARDS...

...REVEALING the valley around her, continuing upwards in a RISING AERIAL SHOT of southern BC, then the whole of the West, the speed of rising increasing until all of Canada is revealed, continuing faster above the atmosphere and still going, finally slowing to a STOP with a view of the whole globe, in orbit above North America, the edges of the globe curving away from us on all sides.

Full Earth (RE-USED)

A pause. SOUND of SHIFTING GEARS.

'FAST REWIND' SOUNDTRACK BEGINS as a pulse of white ice eclipses Canada for a moment. The entire continent is changing shape in TIME-LAPSE -- writhing BACKWARDS IN TIME, as the spinning numbers on the counter show us --

Fireworks of volcanoes in the West. Chunks of Western land break off and drift away. Seas restlessly probe across the land, coastlines fluttering.

A large continent collides with North America, raising massive central mountains. Then the continents separate again.

The other continents drift out of view. North America is half submerged and turns brown and barren... SOUND of 'BRAKING' as the 'FAST REWIND' SOUND STOPS -- the TIME LAPSE grinds to a HALT at 500 million years ago.

SOUND OF GEARS SHIFTING again. FAST FORWARD SOUND EFFECTS start, but now MUCH SLOWER than the rewind we just saw -- the TIME LAPSE is now moving FORWARD at a rate we can easily follow. Proto-North America is submerged except for northern Ontario across to

Greenland, which is fused to it. Events are developing toward the present as the time counts down.

Island arcs collide on the Eastern side, raising mountains, followed by a piece of continent in the North (Scandinavia and part of Russia), and then comes another string of volcanic islands south of that, raising more mountains.

The land turns green (the first forests, at 390 mya). More eastern mountains are pushed up by another incoming submerged mass (Spain). And in the submerged West a string of volcanic islands emerge running North-South.

Enter a whopping big continent from the southeast (Africa joined to South America), looming in from near the South Pole, covered with ice at first.

The northern part collides, starting to raise Himalayan-size mountains, while at the same time (at 360) the western island string suddenly drifts away, out of view, as a huge white ice sheet invades the southern part of this coming-together supercontinent. More of the land is exposed.

The southern part collides at 300, forcing up more of the huge central mountain range of this new giant continent (Pangea). The southern ice sheet retreats.

EXPLOSION up north on the round horizon -- there's a brief DARK PULSE, and we notice all the colors have shifted (biggest mass extinction, at 255).

Collision One

CAMERA begins to TRUCK IN, towards the source of that startling event. As we drift in for a CLOSER view, a chain of Pacific islands are sparkling like fireworks to the south of BC, migrating straight for where we would expect to see BC, which is deep ocean at this point. Shallow seas cover Alberta and northern Canada (200).

INSERT CLOSEUP - SWARMING MASS OF VOLCANO TOPS

BACK TO WIDE -- CAMERA holds position over the island fireworks. Suddenly the continent lunges toward the islands (from opening the Atlantic)-- and a long ridge of sharp seafloor blocks gets PUSHED OUT OF THE SEA in the narrow ocean between the two, along the whole coast.

TRACK IN CLOSER, SHALLOWER -- TIME-LAPSE SLOWS (DECELERATING SOUND)-- everything is converging as we get closer still.

CLOSEUP - GROUND LEVEL - THE RISING SLABS OF OCEAN FLOOR

ANOTHER ANGLE to see the volcanic island mass crash into the

slabs and starting to fold and crumple as they push it all forward --

BACK TO WIDE VIEW

As everything is shoved westward, squeezing, compacting, folding, and melting from erosion, along the full length of North America. New shoreline spreads westward from this erosion, into the Alberta sea, filling it up until all is fused together with the continent. The entire mass slides eastward for three hundred kilometers over the continent... (140)

Collision Two

Enter a second, longer island chain, invading from the Pacific screen left. It collides up the coastline like a giant zipper, crashing and sparking with volcanoes all the way up to Alaska on the horizon (120 to 100). New volcanoes rise along the suture, and folds spread out across all of BC from the pressure. At the same time, on the far right, a huge inland sea invades southward from the Arctic, dividing the continent in two--

Now massive long faults break along the borders of the original two migrating island masses -- the outer mountains of BC slide southward for a thousand miles while the middle mountains slide northward, everything being pushed up now, too, gigantic Rockies rising while sliding sideways against each other.

The outer segment of BC stops, reverses direction, slides and jerks back northward, back to where it started. The inland sea recedes northward (60). The original mountains are eroding down.

CAMERA MOVES IN CLOSER toward two of the major sliding fault lines (40). The Coast Mountains keep erupting -- bursts of flooding lava through the ocean and new land.

CLOSEUP - RIGHT IN THE FAULT VALLEY

The nearby mountains slide past us, eroding down at the same time, while behind them volcanoes burst and grow -- SLOW DOWN THE TIME-LAPSE SOME MORE (20). The mountains oceanward from us continue to lift up (05)...

MASSIVE PULSE OF WHITE! -- mountains smothered by frantic vibrating ICE -- then gone -- TIME LAPSE STOPS -- the mountains have been carved into their familiar glacial cirques of today...

PULL BACK A LITTLE to REVEAL THE GIRL, over the shoulder, looking out at the scene with us. A pause, and then --

A mild EARTHQUAKE TREMOR -- the girl startles -- FREEZE FRAME.

FADE OUT.

FILM 3: THE ICE AGE (ALBERTA/SASK.)

FADE IN:

EXT. ALBERTA BADLANDS - GIRL

To establish the expanse of eroded strata and hoodoos in the Red Deer Valley. Dinosaur Provincial Park. GIRL ponders a dinosaur fossil imbedded in rock at her feet.

POV - the fossil.

ON GIRL turning to look off to the left --

POV - a giant cap-rock boulder atop a hoodoo.

ON GIRL turning to look up to the right --

POV -- grazing cattle and oil rigs atop the cliff.

AERIAL SHOT - THE VALLEY

Looking straight down, girl just a dot. CAMERA STARTS TO RISE, soon REVEALING the whole river amidst the baroque eroded valley forms. Continuing until the Rocky Mountains are in view, increasing speed as all of Canada is revealed, continuing until we're above the atmosphere, SLOWING TO A STOP with a view of the whole globe, in orbit above North America.

Full Earth (RE-USED)

A pause. SOUND of SHIFTING GEARS.

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The other continents drift out of view. North America is half submerged and turns brown and barren... SOUND of 'BRAKING' as the 'FAST REWIND' SOUND STOPS -- the TIME LAPSE grinds to a HALT at 500 million years ago.

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The land turns green (the first forests, at 390 mya). More eastern mountains are pushed up by another incoming submerged mass (Spain). And in the submerged West a string of volcanic islands emerge running north-south.

Enter a whopping big continent from the southeast (Africa joined to South America), looming in from near the South Pole, covered with ice at first.

The northern part collides first, starting to raise Himalayan-size mountains, while at the same time (at 360) the western island string suddenly drifts away, out of view, as a huge white ice sheet invades the southern part of this coming-together supercontinent. More of the land is exposed.

The southern part collides at 300, forcing up more of the huge central mountain range of this new giant continent (Pangea). The southern ice sheet retreats.

EXPLOSION up north on the round horizon -- there's a brief DARK PULSE, and we notice all the colors have shifted (biggest mass extinction, at 255).

Age of Shallow Seas

The central mountains melt down. In the midst of them a huge crack develops, starts to split open. The ocean fills the widening gap as the supercontinent breaks in two and drifts apart (birth of the Atlantic).

CAMERA starts to DRIFT IN SLOWLY as the Eastern continent (Africa/South-America) exits around the southeast side of the globe. A large inland sea spreads across North America, and colliding terrains on the Pacific side push up the Rockies out of the sea.

CAMERA heads for the pulsing inland sea that covers Alberta and divides North America in two from the Arctic to the Gulf of Mexico. In the distance we can see Greenland separating from Canada. CAMERA COMES TO A STOP, HOVERING over the Alberta/Saskatchewan area.

The land rises and spreads as the eroding Rockies shed their material eastward, filling in some of the inland sea. The sea expands and contracts three times in undulating waves, shorelines fluttering erratically, and myriad rivers snake around on the

exposed land. Then the sea expands so big it fills most of our view, so the CAMERA PULLS BACK WIDER to see all of Canada, largely submerged. Forest green spreads up through Alaska and Greenland. No Arctic ice.

Suddenly the sea recedes southward dramatically, almost all gone, just as a meteor STRIKES the Midwest near the bottom of our view, and a bigger one off screen -- DARK PULSE and colouring shift (dinosaur extinction, 65).

Ice Age

Sea gone, rivers shift drainage to the north, a new colouring spreads northward (grassland replacing forests by 30), and an Arctic ice cap appears for the first time. The ice cap grows to cover Greenland and a little of northern Canada and Alaska (10).

ZAP!!! Strobing flashes of white ice pulse over half of Canada at a rate too fast to see, centered over Labrador/Hudson-Bay and northern BC/Alaska -- TIME-LAPSE HITS THE BRAKES REAL HARD! -- A HUNDRED TIMES SLOWER NOW to catch this sight (2 mya). Individual half-second pulses can be seen now for five seconds. The rivers are pushed southward, creating the Mississippi. Now a beat change -- suddenly it's one pulse a second, stretching down twice as far now, past the Canadian border, growing and contracting ice sheets pulse six times back and forth across all of Canada (0.7 mya)--

CAMERA TILTS DOWN, LOWER, CLOSER, on the last ice-sheet pulse, TIME-LAPSE SLOWS DRASTICALLY AGAIN, twenty-five times slower, to see this. The sheet recedes out of view on the curved horizon, followed by colour waves of tundra, forest, and grass, leaving its mark at its forward extent (0.1 mya). Now here it comes back again, right towards us, lobes wiggling like fingers, now starting to melt away again, a gap running up along the edge of the Rockies. CAMERA TRACKS IN on the retreating glacial sheet and TIME-LAPSE SLOWS YET AGAIN, another ten times slower, to be able to see what's happening here --

A lobe of ice blocks a river. A large glacial lake grows at the base of the ice from the detour. The lobe thins and melts back, unblocks the river -- the massive force of the water instantly carves a huge channel through the layers of sedimentary rock from past seas -- and there we have it, the Badlands -- TIME-LAPSE SPEEDS UP as the ice sheet recedes far into the distance.

CAMERA CLOSES IN on the Badlands and in only a few more seconds we've reached the present day and everything shudders to a halt, coming to a STOP over the carved-out Red Deer River Badlands, the view from which we started, with the tiny figure of the girl below, gazing out at us.

FADE OUT.

FILM 4: AFTERMATH OF THE ICE (ONTARIO/MANITOBA)

FADE IN:

EXT. HAMILTON HARBOUR - BOY

To establish the industrial harbour with its distinctive land bridge and gateway to Lake Ontario. BOY strolls along the waterfront, arriving at the entrance to a video game arcade.

INT. ARCADE - VIDEO GAME MACHINE - BOY

Boy is intrigued by a strange new game machine with a steering wheel, like a speed-racer game, but looking more like some kind of time machine. He gets seated, hands on the wheel --

POV - GAME SCREEN

It's a satellite image of Hamilton Harbour. CAMERA ZOOMS IN on the monitor to lose the surround. Pause.

Then the image starts to PULL BACK, taking us UP INTO SPACE, revealing all of Lake Ontario, then more and more of the Great Lakes, then all of Ontario, rising until all of Canada is revealed, but not stopping, continuing faster above the continent, finally SLOWING TO A STOP with a view of the whole globe, in orbit above North America.

Full Earth (RE-USED)

A pause. SOUND of SHIFTING GEARS.

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The other continents drift out of view. North America is half submerged and turns brown and barren... SOUND of 'BRAKING' as the 'FAST REWIND' SOUND STOPS -- the TIME LAPSE grinds to a HALT at 500 million years ago.

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The land turns green (the first forests, at 390 mya), more eastern mountains are pushed up by another incoming submerged mass (Spain), and in the submerged West a string of volcanic islands emerge running North-South.

Enter a whopping big continent from the southeast (Africa joined to South America), looming in from near the South Pole, covered with ice at first.

The northern part collides first, starting to raise Himalayan-size mountains, while at the same time (at 360) the western island string suddenly drifts away, out of view, as a huge white ice sheet invades the southern part of this coming-together supercontinent. More of the land is exposed.

The southern part collides at 300, forcing up more of the huge central mountain range of this new giant continent (Pangea). The southern ice sheet retreats.

EXPLOSION up north on the round horizon -- there's a brief DARK PULSE, and we notice all the colors have shifted (biggest mass extinction, at 255).

Age of Shallow Seas

The central mountains melt down. In the midst of them a huge crack develops, starts to split open. The ocean fills the widening gap as the supercontinent breaks in two and drifts apart (birth of the Atlantic).

CAMERA starts to DRIFT IN SLOWLY as the Eastern continent (Africa/South-America) exits around the southeast side of the globe. A large inland sea spreads across North America, and colliding terrains on the Pacific side push up the Rockies out of the sea (100).

CAMERA focuses tight on Canada as the pulsing inland sea covers Alberta and divides North America in two. In the distance we can see Greenland separating from Canada.

CAMERA CLOSER and LOWER ANGLE on this huge sea expanding and contracting in undulating waves, shorelines fluttering erratically, forest green spreading right up through Greenland. AS CAMERA TILTS LOWER AND CLOSES IN on the southern Manitoba/Ontario area, the sea expands so big it fills most of our view, then quickly retreats south (60), leaving nothing but wriggling rivers. A yellow colour wave spreads to replace the

forest green (30) .

Aftermath of the Ice

WHAMMO!!! Mass of strobing white covers all! -- SCREECH OF BRAKES and SWIFTLY FALLING SOUNDTRACK as TIME-LAPSE ALMOST INSTANTLY SLOWS TO TWENTY THOUSAND TIMES SLOWER to see this before it's all gone -- A giant amboeba of white fills our view, the front half of the last great Ice Age glacial sheet, starting to melt, beginning to withdraw, lobes of ice wiggling like feeling fingers. Meltwater lakes grow out around the ice fingers, changing form like errant pools of mercury on a tabletop, hugging the ice.

CAMERA PANS RIGHT, looking eastward over Quebec and the Atlantic coast on the curved horizon, as the ice recedes from the St. Laurence valley area -- the Atlantic ocean instantly invades towards us, right up to the newly forming Lake Ontario.

CAMERA PANS BACK LEFT (WEST) and PULLS BACK A LITTLE to see the Great Lakes taking on more familiar form in lower screen while further up and back is a giant lake bigger than all the Great Lakes put together. A fast surge of the ice lets this giant Lake Agassiz flow into the others, but then a new lobe surges back down, covering the new Lake Superior. CAMERA PULLS BACK WIDER as the ice recedes north, high enough now to see the arctic -- the glacier covers the Hudson Bay area and Lake Agassiz has expanded and spread out around it, five times the size of the Great Lakes south of it.

The dying glacier is splitting in two down the middle, and when the last small lobe recedes from the north coast near Baffin Island, it lets the pent-up lake water drain out instantly, replaced by ocean -- a giant-sized Hudson Bay, twice its current size. The tail end of Agassiz is left behind as Lake Winnipeg. The coastline of Hudson Bay slowly drains away (as the land lifts up, relieved of the weight of the ice). The last part of the ice melts away in northern Labrador. The green returns. CAMERA STARTS MOVING IN AGAIN toward the Great Lakes, closer to the eastern side as James Bay forms on the receding Hudson Bay -- it all stops dead, TIME-LAPSE STOPS, it's the present day now, CAMERA still MOVING IN to Lake Ontario, in over the Western tip of it, close enough to see signs of Toronto and Hamilton.

CAMERA STOPS. Pause. PULL BACK to REVEAL the edges of the screen of the video game, and we remember that we're in the arcade...

EXT. SKYWAY BRIDGE - THE BOY

The Boy looks out from the bridge at Lake Ontario...

FADE OUT.

FILM 5: THE SUPERCONTINENT CYCLE (GLOBAL)

FADE IN:

EXT. LUNAR SURFACE - EARTHRISE

The blue Earth rises over the lunar horizon, to centre screen. Pow! A meteor impact on the moon. Zap! Another impact on the Earth. CAMERA starts TRACKING IN toward the Earth. The Earth is turning as it grows to fill the screen. Swirling clouds clear away, and the spin of the Earth comes to a halt, bringing into view a strange configuration of continental land masses, dull brown, a single supercontinent stretching from the North Pole down to below the Equator. A LEGEND is SUPERIMPOSED: "ONE BILLION YEARS AGO"

A patch in the middle of the continent starts to GLOW faintly. The legend gets replaced by the familiar COUNTER showing "1,000,000,000."

The Supercontinent Cycle

SOUND OF GEARS ENGAGING, FAST-FORWARD SOUNDTRACK as TIME-LAPSE BEGINS with a hail of meteor impacts. The counter numbers spinning down as time races forward. Ice appears on both poles. The glowing patch indicates the early North American continent (attached to Greenland), which will be added to as things progress. As the centre of the supercontinent, it's landlocked on all sides, and is turned sideways. Though we may not know what it is at first, it will stay highlighted to follow its development.

A piece of continent from the north, over the pole, breaks off and migrates into view over the round horizon, heading south. A smaller piece on the left side cracks apart from North America and follows the first migrating piece southward. The white northern ice cap begins strobing and pulsing, spreading down over the land to the highlighted North America, covering much of the northern landmass (850 million years ago).

The whole remaining supercontinent starts to slowly drift southward. The mountain ranges surrounding half of North America melt down. As everything drifts southward, the two pieces (Africa) collide with the bottom end of the main continent (South America) over the South Pole, pushing up huge mountain ranges where they meet with South America, starting to form Africa. A vast white pulsing ice sheet now grows out over the South Pole as well, obscuring the land here also (750 mya).

Above the equator, a crack splits open on the Pacific side of North America. The top third of the continent (Australia, Antarctica and India) twists away from it, rotating under the northern ice sheet and heading south (725). The pulsing ice expands to cover almost the entire Earth, leaving an opening

around the equator where we can just make out Antarctica/Australia migrating down to collide in the south with the African parts, pushing new land up from the sea between (700). The ice sheets start receding, uncovering Australia/Antarctica and Africa as the mountains between them fuse and fold into greater mountain ranges. Everything has now come together again as a new supercontinent over the South Pole (650).

CAMERA ORBITS SOUTH A LITTLE, to see all the supercontinent amassed below the equator, over the South Pole. Another huge crack is developing on the Atlantic side of North America, which is still turned sideways (600). The ice disappears.

Now the crack splits open and North America drifts free, leaving South America behind as part of Gondwana. Scandinavia breaks free, too. Pow! Mass extinction in ocean (550).

North America migrates above the equator. Two chains of sparking volcanic islands migrate toward North America. Pow! Pow! Two more mass extinctions (450). The island chains plus Scandinavia collide with North America, building a long chain of mountains. North America is flooded. Gondwana now spins rapidly around counterclockwise ninety degrees to become right-side up. A new ice sheet spreads over the southern half of it (425). The land turns green (first forests). The southern ice disappears. Gondwana heads toward the sideways North America. Inland seas undulate over the continents (380).

Gondwana pushes into North America, building mountains, as another white sheet grows over the south. Pow! Another extinction impact (345). Gondwana and Europe push hard into North America, building Himalayan-sized mountains across the middle, and all of it heads further north. The ice spreads to cover half of Gondwana (300), then disappears as this supercontinent Pangea heads north. We're losing sight of North America --

CAMERA ORBITS BACK NORTHWARD to see all of North America/Greenland, joined as part of Pangea (250). Boom! A massive explosion on the northern horizon -- biggest mass extinction ever. The central mountains melt down. North America turns a little more upright now. Pow! Another mass extinction (220).

Big cracks start breaking out along the melted-down mountains between North America and Gondwana, then down through Gondwana between Africa and South America. Suddenly North America breaks free, the two sides drift apart, while an inland sea starts to divide North America up the middle (165). South America breaks away from Africa as North America/Greenland heads out of sight over the northwest horizon. Pow -- mass extinction. Africa heads toward Europe (100).

CAMERA ORBITS WESTWARD to see North America divided by restless inland seaways (75) POW!! Big asteroid explosion in Mexico (dinosaur extinction) -- CAMERA PAUSES ON THIS MOMENTARILY (65) then CONTINUES ORBITING WESTWARD over the wide Pacific, COMING AROUND TO REVEAL Indonesia forming, seas over Russia, India racing from the south on a collision course with Asia. The Himalayas rise as the submerged part of India slides under Asia. FURTHER WEST we see Africa collide to close off the seaway and create the Mediterranean (40). CONTINUING WEST OVER THE ATLANTIC, the Mediterranean briefly dries up and an ice cap forms on the North Pole (08). CAMERA STOPS over the Americas, not yet joined, just in time to see frantic pulsing of ice sheets cover Canada and southwest South America (01) -- TIME-LAPSE STOPS.

The Future

FREEZE FRAME. Very brief. Present day (00). Free of ice for this fleeting moment. Then TIME-LAPSE STARTS AGAIN -- FORWARD INTO THE FUTURE (counter gains a plus sign) -- the ice returns full force, the continents resume drifting westward, changing shape. At +40 the ice still covers the same range, North and South America are separated, changing shape as they drift west. The Baja Peninsula slides up the west coast. CAMERA ORBITS WESTWARD over the Pacific to see North America rammed into Russia, building mountains under the pulsing ice sheet. Australia migrates toward China (+50). FURTHER WEST -- Africa and Arabia ram hard into Europe, building mountains where the Mediterranean used to be, all tilting clockwise and northward, England near the North Pole, and the ice finally disappears (+75). FURTHER WEST -- the Americas reverse direction, heading back toward Africa, closing the Atlantic (+100). POW!! A major asteroid impact in Africa. On this the CAMERA STOPS ORBITING, situated over the Atlantic, watching Africa and the Americas converge.

TIME-LAPSE SPEEDS UP DRASTICALLY. At +250 eastern Canada fuses with Africa, with the horn of Africa rammed into the top of Brazil and mountain ranges running through the middle of the new supercontinent. Suddenly the green colour disappears, the land now brown and barren, the sunlight getting brighter. Africa and the Americas rip apart again. Everything migrates around again. Patches of brown extend out from the continents -- the ocean is drying up (+750). The sun is brighter, the oceans almost gone, continents still migrate, and we can see the long rifts that have been pushing around the plates. The continents migrate over a waterless planet. Meteor craters no longer disappear. TIME-LAPSE STOPS.

CAMERA PULLS BACK from Earth, until the moonscape appears under us again, with the brown, cratered Earth in centre screen, sunlight getting brighter and brighter...

FADE TO WHITE.